

What is claimed is:

1. An integrated circuit chip assembly, comprising:
an integrated circuit chip;
5 a heat spreader;
a thermal interface structure, including a perimeter seal portion, the seal
portion coupled between the heat spreader and at least a portion of a surface of the
integrated circuit chip; and
wherein at least one interface of the perimeter seal portion includes cold
10 formed features.
2. The integrated circuit chip assembly of claim 1, wherein the thermal
interface structure further includes a liquid material located within the perimeter seal
portion and between the integrated circuit chip and the heat spreader.
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3. The integrated circuit chip assembly of claim 2, wherein the liquid material
is in direct contact with both the integrated circuit chip and the heat spreader.
4. The integrated circuit chip assembly of claim 2, wherein the liquid material
20 includes liquid gallium metal.
5. The integrated circuit chip assembly of claim 1, further including a number
of guide portions within the perimeter seal portion.
- 25 6. The integrated circuit chip assembly of claim 1, wherein the perimeter seal
portion is formed from indium.
7. The integrated circuit chip assembly of claim 1, wherein at least one
interface of the perimeter seal portion further includes an intermetallic compound
30 formed from the mating materials.

8. The integrated circuit chip assembly of claim 5, wherein the guide portions form longitudinal spaces having widths of approximately 0.0025 – 0.0050 cm.
9. The integrated circuit chip assembly of claim 1, wherein the thermal
5 interface structure has a thickness of approximately 0.0025 – 0.0050 cm.
10. A processor assembly, comprising:
a processor chip;
a heat spreader;
10 a thermal interface structure, including;
a metal perimeter seal portion to contain an amount of liquid, the seal portion coupled between the heat spreader and at least a portion of a surface of the integrated circuit chip;
an amount of liquid material located within the perimeter seal
15 portion; and
a pump operably coupled to the perimeter seal portion capable of circulating the amount of liquid material through the perimeter seal portion.
11. The processor assembly of claim 10, wherein at least one interface of the
20 metal perimeter seal portion includes cold formed features.
12. The processor assembly of claim 10, wherein the thermal interface structure further includes a number of guide portions within the perimeter seal portion to channel flow of the amount of liquid material.
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13. The processor assembly of claim 10, wherein the metal perimeter seal portion is formed from indium.
14. The processor assembly of claim 10, wherein the heat spreader includes a
30 package cover that substantially encloses the chip and thermal interface structure on a substrate.

15. The processor assembly of claim 14, further including a sealant between the package cover and the substrate.
- 5 16. The processor assembly of claim 10, further including a heat sink coupled to the heat spreader.
17. The processor assembly of claim 10, further including a heat exchanger operably coupled with the pump and the thermal interface structure, the heat
10 exchanger located apart from the thermal interface structure.
18. An information handling system, comprising:
a dynamic random access memory;
a system bus coupled to the dynamic random access memory;
15 a processor assembly coupled the system bus, the processor assembly including:
a processor chip;
a heat spreader;
a thermal interface structure, including;
20 a metal perimeter seal portion to contain an amount of liquid, the seal portion coupled between the heat spreader and at least a portion of a surface of the integrated circuit chip;
an amount of liquid material located within the perimeter seal portion; and
25 a pump operably coupled to the perimeter seal portion capable of circulating the amount of liquid material through the perimeter seal portion.
19. The information handling system of claim 18, wherein the thermal interface structure is coupled between the heat spreader and at least a portion of a backside
30 surface of the integrated circuit chip in flip-chip orientation.

20. The information handling system of claim 18, further including a heat exchanger operably coupled with the pump and the thermal interface structure, the heat exchanger located apart from the thermal interface structure.
- 5 21. The information handling system of claim 18, wherein the dynamic random access memory includes synchronous dynamic random access memory.
22. A method of cooling an integrated circuit die, comprising:
conducting heat from a surface of an integrated circuit die into a metal seal
10 structure located in a region between the surface of the integrated circuit die and a heat spreader;
conducting heat from the surface of the integrated circuit die into an amount of liquid material contained within the region and within the metal seal structure;
circulating the amount of liquid material.
- 15 23. The method of claim 22, wherein circulating the amount of liquid material within the region includes circulating the amount of liquid material external to the region to a heat transfer device.
- 20 24. The method of claim 22, wherein conducting heat from the surface of the integrated circuit die into an amount of liquid material includes conducting heat into an amount of liquid material that forms a direct interface with both the integrated circuit die and the heat spreader.
- 25 25. A method of manufacturing an integrated circuit assembly, comprising:
forming a perimeter seal portion;
attaching the perimeter seal portion between an integrated circuit chip and a
heat spreader wherein at least one interface of the perimeter seal portion is formed
using cold forming techniques; and
30 placing an amount of liquid material between the integrated circuit chip and the heat spreader within the perimeter seal portion.

26. The method of claim 25, further including operatively coupling a pump to the seal portion to circulate the amount of liquid.

5 27. The method of claim 26, further including operatively coupling a heat exchanger to the pump and the seal portion.

28. The method of claim 25, wherein forming a perimeter seal portion includes stamping a perimeter seal portion

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29. The method of claim 25, wherein forming a perimeter seal portion is concurrent with attaching the seal portion to at least one interface.

30. The method of claim 25, wherein forming a perimeter seal portion includes

15 forming an indium perimeter seal portion.